

14. *On Some Collembola-Arthropleona from South Africa and Southern Rhodesia.*—By H. WOMERSLEY, A.L.S., F.R.E.S. (Entomologist, South Australian Museum; late Entomologist, Section of Field and Pasture Pests, Division of Economic Entomology, Australian Council for Scientific and Industrial Research.)

(With 12 Text-figures.)

ALTHOUGH the Collembola fauna of the African Continent is, through the writings of Wahlgren, Schött, Börner, Philiptschenko, Denis, and Handschin gradually becoming known for Egypt, Sudan, Abyssinia, British East Africa, Algeria, Tripoli, and the Cameroons, that is generally the northern and eastern parts of the continent, up to the present our knowledge of the southern half, from the Equator to the Cape, has been extremely scanty.

In 1903 Börner described *Paronella fülleborni*, *Pseudosira nyassica*, *Lepidocyrtinus flavovirens* and *L. annulicornis* from Nyassaland. In 1907, in his paper on the Collembola of East and South Africa and Madagascar, he listed *Azelsonia littoralis* (Mz.) (= *thalasophila* C.B.) from Madagascar, *Lepidocyrtus lanuginosus* Tillbg. s.sp. *ceratoxenus* C.B., Pemba Is., off the coast of Zanzibar, and *Lepidocyrtinus* (*Mesira*) *voeltzkowi* C.B. from Madagascar. From South Africa in 1908 he recorded *Anurida maritima* Guer. from Angra Pequena Bay, S.W. Africa, *Pseudosira nyassica* var. *pallens* C.B. from Little Namaland, *Lepidocyrtinus* (*Mesira*) *laeta* C.B. from Port Nolloth, Little Namaland, and *Cyphoderus colorus* C.B. also from the latter locality. In his paper on New *Cyphoderidae*, Börner described from S.W. Africa and Natal, *Cyphoderus colorus*, *natalensis*, *limboxiphius*, *bidenticulata* (Parona), and *Pseudocyphoderus wasmanni*.

Wahlgren (1908) described the following from Kenya Colony, just south of the Equator: *Proisotoma sjöstedti*, *Dicranocentrus meruensis*, *Lepidocyrtus cyaneus* Tullbg., *fuscatus*, *extensus*, *obtusus*, *flavovirens* C.B., *Lepidocyrtinus annulicornis* C.B., *armillata*, *Paronella nigromaculata* Schtt., *fülleborni* C.B.

Then Philiptschenko in 1926 described from material collected in British East Africa, *Pseudachorutes niloticus* Wahl., *mabiriensis*

Philipt., *Ceratrimeria flavantennatus*, C. (*Linnaniemia*) *gigas*, *Achorutes sokolowi*, *Lepidocyrtinus flavovirens* C.B. var. *annulosa* Wahl., *Lepidocyrtus extensus* Wahl., *Dicranocentrus meruensis* Wahl., *D.* (*Heteromuricus*) *dogieli* Philipt., and *Paronella nigromaculata* Schtt.

In 1926 J. M. Brown recorded *Entomobrya minima* Brown from Natal, while in 1929 from Southern Rhodesia I described and recorded the following: *Hypogastrura manubrialis* (Tullbg.), *myrmecophila* Wom., *Xenylla rhodesiensis* Wom., *Lepidocyrtinus* (*Mesira*) *annulicornis* C.B., *Cyphoderus cuthbertsoni* Wom., *africanus* Wom., and *limboxiphius* C.B.

From the Seychelles Carpenter described in 1916 *Achorutes sexoculatus*, *Axelsonia littoralis* (Mz.), *Isotomurus obscurus*, *Dicranocentrus longicornis*, *Entomobrya seychellarum*, *Lepidocyrtus silvestris*, *obscuricornis*, *annulicornis*, *stramineus*, *fryeri*, *imperialis*, *gardineri*, *Acanthurella braueri* C.B., *Paronella coerulea*, *flava*, *Salina scotti*, *celebensis* Schffr. (= *pallida* Carp.), *Cyphoderus insularum*.

The above list totals only 53 species for the whole of Africa lying south of the Equator. Omitting those from the Seychelles and Madagascar we have only 34 known from the mainland.

In 1928 Denis described *Hypogastrura tetrophthalma* and *Vertagopus minos* from Italian Somaliland (9A).

In 1930, while carrying out research in Cape Province on behalf of the Australian Council for Scientific and Industrial Research, I was able to make a considerable collection of this order of insects. In addition I have been able, through the kindness of the Director of the South African Museum, Dr. Gill, to study a large amount of material collected by members of the staff in various parts of South Africa. I have also had small lots of Collembola sent me from time to time by Mr. M. C. Mossop from Southern Rhodesia. I take the opportunity of including the Rhodesian material in this paper, and would here wish to express my sincere gratitude to the above colleagues for their valuable help.

In this paper the following species are recorded or described:—

- Hypogastrura armata* (Nic).
 ,, *armata* v. *trispina* v. nov.
 ,, *pseudopurpurascens* Wom.
 ,, *longispina* (Tullbg.).
 ,, *viatica* (Tullbg.).
 ,, *manubrialis* (Tullbg.).
 ,, *manubrialis* v. *neglectus* C.B.
 ,, *sahlbergi* v. *rosea* v. nov.

- Xenylla maritima* Tullbg.
Friesea claviseta Axels.
Polyacanthella barnardi sp. nov.
Certrimeria flavoantennatus v. *capensis* v. nov.
Brachystomella parvula (Schffr.).
 „ *capitata* sp. nov.
Anurida maritima Guer.
Achorutes natalensis sp. nov.
Onychiurus fimetarius (L.).
Tullbergia callipygos C.B.
 „ *krausbaueri* C.B.
Isotomodes productus (Axels.).
Isotomurus palustris (Müll.).
 „ *palustris* v. *balteata* Rt.
Isotoma mauretana Handschin.
 „ *bituberculata* Wahl.
 „ *mossopi* sp. nov.
Proisotoma schötti (D.T.).
 „ *ripicola* Linnan.
 „ *africana* sp. nov.
Vertagopus minos Denis.
Entomobrya decemfasciata Pk.
 „ *nivalis* f. *immaculata* Schffr.
 „ *nivalis* f. *maculata* Schffr.
Lepidocyrtus lanuginosus Gmel.
Pseudosira grisea sp. nov.
 „ *grisea* v. *annulata* v. nov.
Lepidocyrtinus incertus Handschin.
 „ *pseudocoeruleus* Den.
 „ *cooperi* v. *barnardi* v. nov.
 „ *capensis* sp. nov.
 „ *flavovirens* C.B.
 „ *flavovirens* v. *annulosa* Wahl.
 „ *annulipes* Handschin.
Neophorella dubia gen. et sp. nov.
Cyphoderus natalensis C.B.
 „ *arcuatus* v. *aethiopicus* Handschin.

Of this list 33 species and 11 varieties are new to Southern Africa, and 19 species and 8 varieties are additions to the continent as a whole. One genus, 8 species, and 5 varieties are new to science. The total species now known to occur in the continent number 160.

At the end of the paper the distribution of species throughout the country is given in tabular form.

COLLEMBOLA-SYMPHYPLEONA Börner, 1901.

SUPERFAMILY PODUROIDEA (*Poduromorpha* Börner, 1913).

Family HYPOGASTRURIDAE Börner, 1913.

Genus HYPOGASTRURA Bourlet, 1839, Börner, 1906.

- syn. = 1746, *Podura* Linné (ad partem).
 1835, *Achorutes* Templeton (ad partem).
 1839, *Hypogastrura* Bourlet.
 1872, *Achorutes* Tullberg.
 1896, *Schöttella* Schäffer.

Subgenus HYPOGASTRURA s. str. Börner, 1906, Linnaniemi, 1912.

- syn. = 1896, *Achorutes* Schäffer (ad partem).
 1901, *Achorutes* Börner (ad partem).
 1906, *Hypogastrura* s. str. Börner (ad partem).

HYPOGASTRURA ARMATA (Nicolet), 1841.

(Text-fig. 1.)

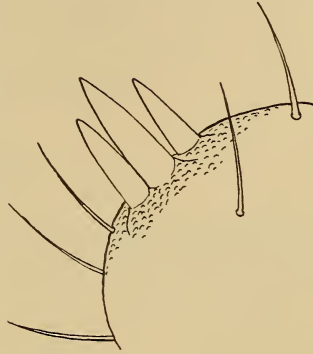
- Podura armata* Nicolet, 1841.
Achorutes armatus Tullberg, 1871.
 „ *boletivorus* Packard, 1873.
 „ *texensis* Packard, 1873.
 „ *pratorum* Packard, 1873.
 „ *marmoratus* Packard, 1873.
 „ *filiformis* Wahlgren, 1906.
Hypogastrura armata (Axelson) Linnaniemi, 1912.

A cosmopolitan species which appears to be widely distributed in South Africa. It has been taken at the following places:—

Inchanga, Natal, Nov. 1917 (K. H. Barnard); Langklip Siding, Gordonia, C.P., Aug. 1925 (K. H. B.); Stellenbosch, C.P., 24th July, 12th Aug. 1930 (H. W.); Kloof Nek, Cape Town, 27th Aug. 1930 (H. W.); Cape Town, 30th July 1930 (H. W.); Stellenbosch, C.P., 28th Aug. 1927 (A. J. Hesse).

Among the specimens which were collected at Stellenbosch in 1927 by Dr. A. J. Hesse was a single abnormal specimen. In this there were three anal spines instead of the usual two. Such three-

spined varieties are by no means uncommon in many species of *Hypogastrura*, but usually the additional spine is placed posterior to the others. In this particular specimen, however, the third spine is situated immediately between the others and laterally touching them (text-fig. 1). It is, moreover, longer than the normal pair and all three are straighter than usual. It is doubtful whether one is justified in proposing a varietal name for what is probably only an aberration, but if so, then the name *trispina* n. var. would be applicable, as a three-spined variety of this species has not previously been recorded. Type in the Cape Town Museum.



TEXT-FIG. 1.—*Hypogastrura armata* (Nic.) var. *trispina* v. n. Anal spines.

HYPOGASTRURA LONGISPINA (Tullberg), 1876.

Achorutes longispina Tullberg, 1876.

Hypogastrura longispina (Axelson) Linnaniemi, 1911.

Specimens of this species, which is very closely related to the preceding, were collected by Dr. K. H. Barnard at Inchanga, Natal, Nov. 1917, and also at Langklip Siding, Gordonia, C.P., Aug. 1925.

HYPOGASTRURA PSEUDOPURPURASCENS Womersley, 1928.

Hypogastrura purpurascens Linnaniemi, 1912 (ad partem).

Taken by the author in the outskirts of Cape Town, 24th Aug. 1930.

HYPOGASTRURA VIATICA (Tullberg), 1872.

Achorutes viaticus Tullberg, 1872.

„ *murorum* Lubbock, 1873.

„ *humicola* Meinart, 1896.

Hypogastrura viatica (Axelson) Linnaniemi, 1911.

This is another species which seems to be acquiring a cosmopolitan status. Early in 1930 Prof. W. D'Arcy Thompson very kindly sent me a tube of Collembola collected on shore pools at Sea Point, Cape

Town, in Sept. 1929. On examination, all the specimens proved to be this species and not the expected littoral species of *Anurida*.

HYPOGASTRURA MANUBRIALIS (Tullberg), 1869.

Achorutes manubrialis Tullberg, 1869.

„ *schötti* Reuter, 1895.

„ *assimilis* Krausbauer, 1898.

„ *neglectus* Börner, 1901.

The typical form of this widely distributed species was plentiful in material from Kimberley, Feb. 1915 (Miss Wilman), and was also found by the author in the following localities:—

Elsenberg, 24th July 1930; Rondebosch, C.P., 29th July 1930; Stellenbosch, C.P., 24th July, 29th Aug. 1930.

var. NEGLECTUS Börner, 1901.

Achorutes neglectus Börner, 1901.

This variety lacks the two anal spines. It was taken at Stellenbosch, C.P., 29th Aug. 1930 (H. W.).

HYPOGASTRURA SAHLBERGI (Reuter), 1895.

Achorutes sahlbergi Reuter, 1895.

„ *schneideri* Schäffer, 1896.

Hypogastrura sahlbergi (Axelson) Linnaniemi, 1912.

var. ROSEA n. var.

Agreeing with the type form in everything except colour. In life it is of a beautiful pink shade and was found in fair numbers on some damp rocks near the top of Lion's Head, Cape Town, on 30th July and 3rd Aug. 1930 (H. W.).

Genus XENYLLA Tullberg, 1896.

XENYLLA MARITIMA Tullberg, 1896.

Xenylla brevicauda Reuter, 1895.

This is a fairly common species in the Cape Town district and was found by the author at Stellenbosch, 12th Aug. 1930, Fish Hoek, 23rd Aug. 1930, and Hout Bay, Aug. 1930.

Genus FRIESEA Dalla Torre, 1895.

- syn. = 1871, *Triaena* Tullberg.
1892, *Pseudotullbergia* Schäffer.
1893, *Oudemansia* Schött.
1894, *MacGillivraya* Grote.
1901, *Achorutoides* Willem.

FRIESEA CLAVISETA Alexson, 1900.

? *Friesea caldaria* Guthrie, 1903.

A few specimens of this European species were found under the loose damp bark of a fallen log at Stellenbosch, C.P., 12th Aug. 1930 (H. W.).

Genus POLYACANTHELLA Schäffer, 1897.

- syn. = 1925, *Conotelsa* Denis.
1931, *Friesea* Denis.

POLYACANTHELLA BARNARDI n. sp.

(Text-fig. 2, a-d.)

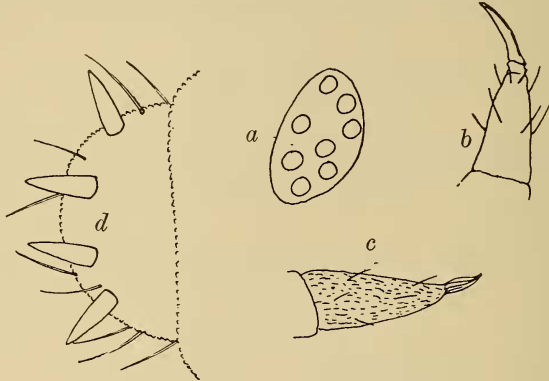
Description.—Length to 1.4 mm. Colour entirely blue-black. Antennae shorter than head; segments I : II : III : IV = $1\frac{1}{4}$: $1\frac{1}{4}$: 1 : $\frac{3}{4}$; IV with trilobed apical knob and an uncertain number of olfactory hairs. Mouth-parts suctorial. Ocelli 8 on each side on a darker patch, equal. Postantennal organ wanting. Claws long and narrow, without teeth. Empodial appendage absent. Tibiotarsus without clavate hairs. Furca well developed; mucro with inner and outer lamellae; dentes 4 times as long as mucro. Clothing of long, fine, and fairly abundant setae; cuticle strongly granular. Anal spines 4 in a transverse row on abd. VI, long, straight, and not on papillae.

Co-types in Cape Town Museum.

Locality.—In numbers, Delagoa Bay, Oct. 1912 (K. H. B.).

This species comes very close, according to the table given by Denis (1931), to *Friesea (Polyacanthella) coerulea* (Schött) (syn. *Oudemansia c.* Schött). In his excellent work on the Collembola of Costa Rica (Denis, 1931) M. Denis discusses very fully the two genera *Friesea* and *Polyacanthella*, and mainly because *Friesea Bodenheimeri*, described by Börner (1927) from Palestine, has 5 (curved) anal spines instead of the usual 2-3, hitherto taken as the character separating *Friesea*, he has placed all the species together under the prior name of *Friesea*. While hesitating to disagree with the views of such an able Collembologist as M. Denis, I think that there is an essential

and important difference in the very nature of the anal spines of the two genera. In *Friesea* they are generally small, evenly curved, and arise from very definite papillae. In all species which have been described under the name of *Polyacanthella* they are usually much longer, straight, and there is no sign of any papillae. It



TEXT-FIG. 2.—*Polyacanthella barnardi* n. sp.

still seems preferable to retain *Polyacanthella* as separate from *Friesea* on these grounds, and as follows:—

Anal spines 3, one behind, two in front, occasionally 0, 2, or 5, but always curved and arising from distinct papillae. Furca reduced. Ocelli 8 or less. Empodial appendage absent.

Genus FRIESEA Dalla Torre, 1875.

Anal spines 4 or more, always straight and not on papillae.

Genus POLYACANTHELLA Schäffer, 1897.

In the latter genus would be included *P. afurcata* Denis, *P. acuminata* Denis, *P. brevicauda* Schäffer, and *quinquspino* Wahlgren, as well as the new species described above.

Genus CERATRIMERIA Börner, 1906.

syn. = 1896, *Schöttella* Schäffer (ad partem).

1929, *Linnaniemia* Handschin.

CERATRIMERIA FLAVOANTENNATUS (Philipschenko), 1926.

Pseudachorutes flavoantennatus Philipschenko, 1926.

var. *capensis* n. var.

This variety agrees more with *P. flavoantennatus*, described by Philipschenko from British East Africa, than with *P. mirabilis*

Handschin from Abyssinia. It is deep blue in colour, even on the apical antennal segments, but has conspicuous lateral yellowish-white spots on the head, thorax II and III, abdomen II, IV, and a medial spot on V. The ocelli are 8 on each side. The post-antennal organ resembles that of *flavoantennatus* rather than *mirabilis*. The furca, however, recalls that of the latter species.

In his paper (1929) Handschin expresses his own doubts as to whether his species was really more than a variety of *flavoantennatus*. This intermediate form from South Africa tends to confirm these doubts and it seems reasonable to consider *mirabilis* as a variety of the British East African species.

Localities.—Inchanga, Natal, Nov. 1917 (K. H. B.); slopes of Table Mt., Cape Town, 5th Aug. 1919 (K. H. B.), same locality 29th Aug. 1930 (H. W.).

Co-types in Cape Town Museum.

On the genus Ceratrimeria.

Denis (1931) has very helpfully revised the known forms of this and the allied genus *Pseudachorutes*, from which *Ceratrimeria* differs in the great development of paratergites. He has, however, placed *flavoantennatus* in the genus *Pseudachorutes* on the ground that Philiptschenko's figure does not so definitely show the paratergites characteristic of Börner's genus. Handschin expressed the opinion that his species *mirabilis* is very similar to *flavoantennatus*, and *mirabilis* is definitely placed by Denis in *Ceratrimeria*. The new variety described in this paper is intermediate and is very definitely also a *Ceratrimeria*, so that I have no hesitation in removing typical *flavoantennatus* from *Pseudachorutes* and putting it in the genus *Ceratrimeria*.

Note.—Throughout Denis's paper it should be noticed that *Ceratrimeria* is invariably spelt wrongly as *Ceratimeria*.

Genus BRACHYSTOMELLA Agren, 1903.

syn. = 1896, *Schöttella* Schäffer (ad partem).

1903, *Brachystomella* Agren.

1905, *Schöttellodes* Becker.

1906, *Chondrachorutes* Wahlgren.

BRACHYSTOMELLA PARVULA (Schäffer), 1896.

Schöttella parvula Schäffer, 1896.

„ *media* Axelson, 1900.

Chondrachorutes wahlgreni Denis, 1924.

Schöttella minor Schtscherbakow, 1899.

? „ *crassicornis* Schött, 1902.

? *Brachystomella maritima* Agren, 1903.

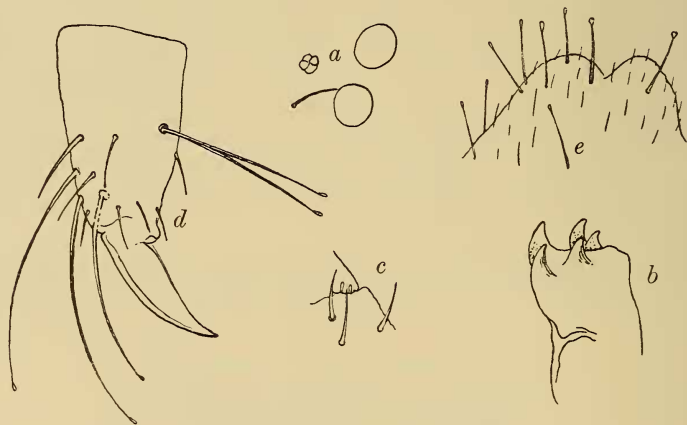
This is a common species in South Africa occurring on cultivated land, amongst decaying vegetable matter, under bark, in fungi, etc., and is possibly an introduction from Europe. It has been found in the following localities:—

Burghersdorp, Jan. 1913 (Robertson); Cape Town, 9th May 1916 (K. H. B.); Elsenerg, C.P., 24th July 1930 (H. W.); Rondebosch, C.P., July 1930 (H. W.); Kloof Nek, Cape Town, 3rd Aug. 1930 (H. W.); Stellenbosch, C.P., 19th Aug. 1930 (H. W.).

BRACHYSTOMELLA CAPITATA n. sp.

(Text-fig. 3, a-e.)

Diagnosis.—Length 1.5 mm. Colour brownish with darker fine mottlings. Antennae slightly shorter than, segments I : II : III : IV = 1 : 1 : 1½ : 1⅓, III and IV separated, III with normal sensory organ, and IV with apical exsertile knob. Ocelli 8 on each side on



TEXT-FIG. 3.—*Brachystomella capitata* n. sp.

a dark patch, equal; post-antennal organ present, 4-lobed, small. Mandible wanting, head of maxillae broad and toothed. Claws strong without inner teeth. Emp. appendage absent. Tibiotarsus with 2-3 outer subapical clavate hairs reaching beyond tip of claws and also with 2 others, equally clavate, on inner face about the

middle. Furca wanting. Anal spines wanting. Clothing of long, fine, distinctly capitate setae.

Co-types in the Cape Town Museum.

This species will probably be found to be widely distributed in South Africa. It occurs in similar habitat to the preceding and has been found at Cape Town, June 1915 (K. H. B.), and Stellenbosch, C.P., 12th Aug. 1930 (H. W.).

Genus ANURIDA Laboulbene, 1865.

ANURIDA MARITIMA Laboulbene, 1865.

This littoral species was recorded by Börner (1908) from specimens collected by Dr. L. Schulze at Angra Pequena (= Lüderitzbucht, South-West Africa) in July 1903. The author has examined specimens from the following localities:—

Saldanha Bay, C.P., 5th Sept. 1912 (K. H. B.); Cape Peninsula, 1914 (K. H. B.); Melkbos Strand, C.P., 28th Oct. 1927 (K. H. B.); Kleinmond, C.P., Feb. 1927 (K. H. B.); Durban, Natal, Jan. 1913 (K. H. B.); Hout Bay, C.P., 11th Feb. 1914 (K. H. B.); Sea Point, Cape Town, 31st July 1930 (H. W.); Muizenberg, C.P., 26th July 1930 (H. W.).

Genus ACHORUTES Templeton, 1835.

syn. = 1835, *Achorutes*, Templeton (ad partem).

? 1840, *Blax*, Koch.

1842, *Anoura*, Gervais.

1869, *Anura*, Tullberg.

1893, *Neanura*, MacGillivray.

ACHORUTES NATALENSIS n. sp.

(Text-fig. 4, a-c.)

Description.—Length 2 mm. Colour (in spirit) yellowish-white. Antennae shorter than head, segments subequal, I and II with outstanding long, clavate, serrated setae, III with normal sensory organ, IV with at least 3 olfactory hairs. Ocelli 2 on each side, not pigmented, situated as in figure. Claws strong, unarmed. Body tubercles granular and disposed in a normal manner, but the long setae are mainly clavate and serrated.

Co-type in Cape Town Museum.

This species was represented by 2 specimens from Inchanga, Natal, collected by Dr. Barnard in November 1917. It differs from



TEXT-FIG. 4.—*Achorutes natalensis* n. sp.

A. montanus Handschin (1929), from Abyssinia, and *A. sokolowi* Philiptschenko, from British East Africa in the nature of the setae, and from the latter in the unarmed claws.

Family ONYCHIURIDAE Börner, 1913.

syn. = *Aphorurinae* Börner, 1901.

Aphorurini Börner, 1901.

Genus ONYCHIURUS Gervais, 1841, Börner, 1901.

syn. = 1758, *Podura* Linnè (ad partem).

1838, *Lipura* Burmeister (ad partem).

1841, *Onychiurus* Gervais (in litt.).

1841, *Anurophorus* Nicolet (ad partem).

1843, *Adicranus* Bourlet (ad partem).

1893, *Aphorura* MacGillivray.

1909, *Protaphorura* Börner.

ONYCHIURUS FIMETARIUS (Linnè, Lubbock).

Podura fimetaria Linnè, 1766.

Lipura fimetaria Lubbock, 1867.

„ *inermis* Tullberg, 1869.

„ *wrighti*, Carpenter.

Aphorura inermis Schäffer.

Onychiurus pseudofimetarius Folsom.

A well-known inhabitant of soils in many parts of the more tem-

perate countries, particularly in the Northern Hemisphere. It often occurs at the roots of plants in sufficient numbers to do considerable damage.

Cape Town, under stones, etc., 3rd Aug. and 6th Sept. 1930 (H. W.).

Genus TULLBERGIA Lubbock, 1876.

syn. = 1900, *Stenaphorura* Absolon.

1901, *Mesaphorura* Börner.

1902, *Börneria* Willem.

TULLBERGIA KRAUSBAUERI Börner, 1901.

Specimens agreeing completely with this European species were found by the author in the following localities:—

Hout Bay, C.P., under stones, 4th Aug. 1930; Cape Town, 19th Aug. 1930; Stellenbosch, C.P., 18th Aug. 1930.

TULLBERGIA CALLIPYGOS Börner, 1901.

In similar habitat to the above at Cape Town, Aug. 1930 (H. W.).

SUPERFAMILY ENTOMOBRYOIDEA (*Entomobryomorpha*,
Börner, 1913).

Family ISOTOMIDAE Börner, 1913.

Genus ISOTOMODES (Axels.) Linnaniemi, 1907.

syn. = 1903 *Isotoma* Axelson (ad partem).

ISOTOMODES PRODUCTUS (Axelson), 1907.

Isotoma elongata Axels., 1903 (nec. MacGill., 1896).

„ *producta* Axelson, 1906.

A rare species in Europe, it was found by the author under stones on Signal Hill, Cape Town, 31st Aug. 1930.

Genus ISOTOMURUS Börner, 1903.

syn. = 1776, *Podura* Müller (ad partem).

1839, *Isotoma* Bourlet (ad partem).

ISOTOMURUS PALUSTRIS (Müller), 1776.

Podurus palustris Müller, 1776.

Isotoma palustris Tullberg, 1872, Lubbock, 1873, Reuter, 1876 (ad partem), 1880.

Isotoma aquatilis Lubbock, 1873 (ad partem).

„ *stuxbergi* Tullberg, 1876, Moniez, 1891, Jacobson, 1898.

Isotomurus palustris Börner, 1903.

Isotoma tricolor Packard, 1873.

„ *aequalis* MacGillivray, 1893.

Two specimens were found of the typical form of this widely distributed insect at Ceres, C.P., Oct. 1927 (K. H. B.).

var. BALTEATA Reuter, 1876.

Taken on Table Mountain, Cape Town, 12th Sept. 1913 (K. H. B.), and at Stellenbosch, C.P., 28th Aug. 1927, by Dr. Hesse.

Genus ISOTOMA Bourlet, 1839.

syn. = 1740, *Podura* Linnè.

1841, *Desoria* Agassiz.

Subgenus ISOTOMA s. str. Börner, 1906.

ISOTOMA MAURETANICA Handschin, 1926.

Specimens referable to this species, which was described by Prof. Handschin from Algeria, have been taken in South Africa as follows:—

Table Mountain, Cape Town, 4th June 1913 (K. H. B.); Stellenbosch, C.P., 7th July 1930 (H. W.).

ISOTOMA BITUBERCULATA Wahlgren, 1906.

Proisotoma bituberculata Börner, 1907.

This species was described somewhat insufficiently by Wahlgren from Egypt in 1906. Börner later referred it doubtfully to the genus *Proisotoma*. Handschin in 1926 found it in material from Algeria, and his description and figures, as pointed out by Denis (1931), show conclusively that it is a true *Isotoma*. Many specimens were present in material collected at Inchanga, Natal, by Dr. Barnard in Nov. 1917, and from these the author unhesitatingly confirms the conclusion of Handschin and Denis.

ISOTOMA MOSSOPI n. sp.

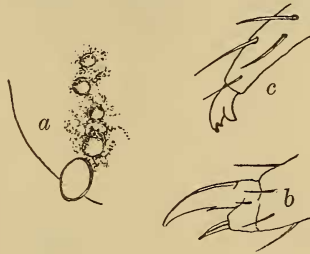
(Text-fig. 5, a-c.)

Description.—Length 0.6 mm. Colour whitish-grey, lightly flecked with bluish pigment, rather darker around the ocelli. Ocelli 4 on

each side, almost in a straight longitudinal line and not on a distinct patch, anterior ocellus the largest. Post-antennal organ broadly elliptical, more than 2 ocelli in length. Antennae half as long again as the head, segments I : II : III : IV = 10 : 15 : 15 : 25; antennal organ III indeterminate. Claw with strong inner tooth. Empodial appendage as in figure. Tibiotarsus without clavate hairs. Furca reaching ventral tube, mucro with 3 teeth, proximal tooth larger than anteapical tooth. Clothing of fairly numerous simple setae.

Co-type in Cape Town Museum.

Localities.—Several specimens were taken in soil at the Experimental Station, Salisbury, S. Rhodesia, by Mr. M. C. Mossop, on 16th June 1932. Coll. No. 3159.



TEXT-FIG. 5.—*Isotoma mossopi* n. sp.

Subgenus VERTAGOPUS Börner, 1906.

VERTAGOPUS MINOS Denis, 1928.

(Text-fig. 6, a-g.).

Locality.—Gatooma, S. Rhodesia, 16th Dec. 1930 (M. C. Mossop).

This very interesting species was described from Italian Somaliland by Denis in 1928 (9A). It is remarkable in that, like *Guthriella muskegis* (Guthrie) from Minnesota, U.S.A., the male exhibits extreme secondary modifications. In the American form the male has very strong lateral horn-like extensions of the posterior abdominal segments and numerous clavate ciliated setae on the abdomen. The African species shows a pair of long curved horns on the head as well as a number of long straight spines. The latter are also present on the sides of the thoracic segments. On abdomen III and IV laterally is a pair of long pointed and ciliated setae, and on IV and V a transverse series of shorter ciliated setae. The data supplied by Mr. Mossop is of interest and I quote it here in full:

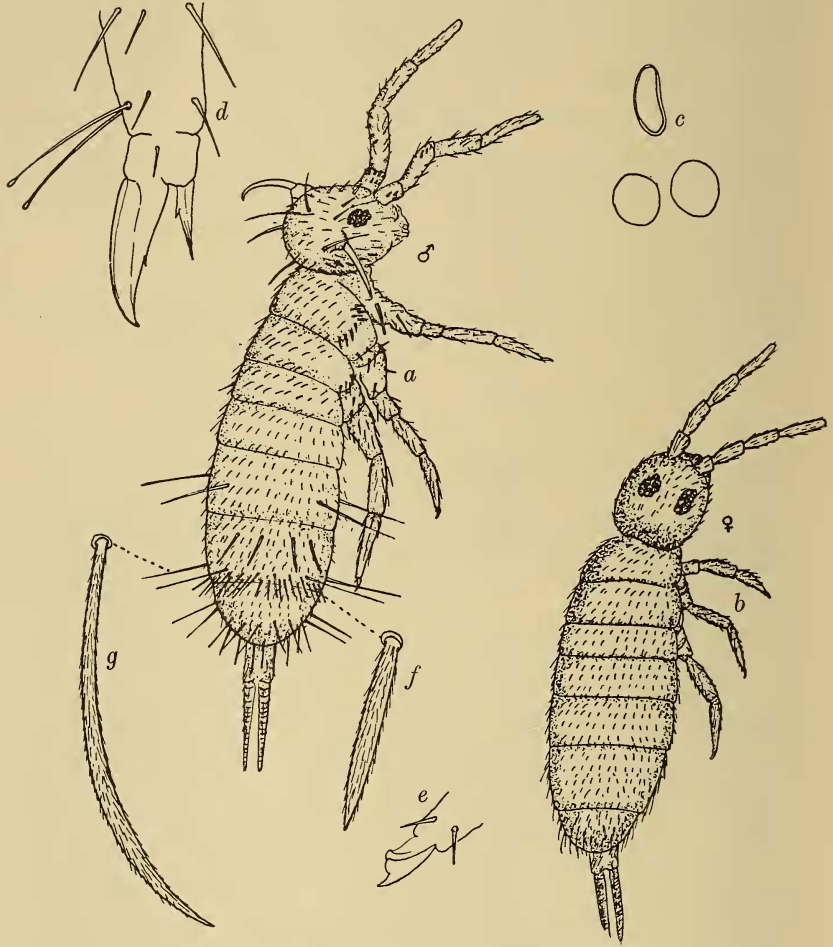
“On wet soil in colonies of many thousands and of various shapes, up to 8 feet long by 3 or 4 inches wide; sometimes in irregular patches up to 18 inches in diameter, appearing as a purplish slaty powder.”

Specimens were sent from two colonies, in one of which the insects appeared to be much smaller in size. In this lot no adults could be found, but the specimens were identical with immature ones in the other tube, which contained also adults of both sexes.

Genus PROISOTOMA Börner, 1906.

syn. = 1871, *Isotoma* Tullberg (ad partem).1901, *Proisotoma* Börner (as subgen., ad partem).

1906, „ Börner (as genus).

TEXT-FIG. 6.—*Vertagopus minus* Denis.*PROISOTOMA SCHÖTTI* (Dalla Torre), 1895.*Isotoma litoralis* Schött, 1893, Reuter, 1895.„ *schötti* Dalla Torre, 1895.„ *lacustris* Schött, 1896.*Proisotoma schötti* (Axelson) Linnaniemi, 1907.

This European species is most probably an introduction to South Africa in agricultural material. The specimens agreed entirely with typical European ones, except that they were banded as in var. *balteata* Reuter of *Isotomurus palustris* Müller. Several specimens were present in material collected by Dr. Hesse at Stellenbosch, C.P., 28th Aug. 1927.

PROISOTOMA RIPICOLA Linnaniemi, 1914.

? *Isotoma agilis* Schtscherbakow, 1899.

Two normal specimens of this European form were present in Tube No. 2605, collected at the Experiment Station, Salisbury, S. Rhodesia, March 1930. The insects were taken under mown grass by Mr. Cuthbertson.

While normal and agreeing with Linnaniemi's description and figures, they exhibit a slight difference in that the post-antennal organ is distinctly notched at the sides and not entire. Whether such a character as this should be considered as specific is doubtful.

PROISOTOMA AFRICANA n. sp.

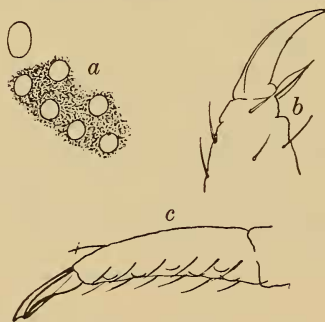
(Text-fig. 7, a-c.)

Description.—Length 0.5 mm. Colour bluish-violet. Eye patches black. Ocelli 6 on each side. Post-antennal organ broadly oval and a little longer than a single ocellus. Antennae shorter than head, segments I : II : III : IV = $\frac{1}{2}$: 1 : $1\frac{1}{4}$: $2\frac{1}{4}$. Claw short with a single fine inner tooth. Empodial appendage with broad inner and narrow outer lamellae. Furca barely reaching ventral tube, dentes with many setae dorsally, twice as long as mucro, mucro with 2 distal teeth and inner and outer lamellae. Thorax II dorsally equal to III; abd. III : IV = 2 : 3. Clothing of numerous fine simple setae. Rami with 4 barbs.

Co-types in Cape Town Museum.

Localities.—In large numbers on rain pools at Kimberley, Feb. 1915 (Miss Wilman), and in the same habitat and numbers at Cape Town, June 1915 (K. H. B.).

In his excellent table of the known species of this genus (Denis,



TEXT-FIG. 7.—*Proisotoma africana* n. sp.

1931), this new species would come very close to *P. centralis* D. and *P. filifera* D., both from Trinidad. It is somewhat intermediate in that it agrees with the first in having only a very short filament to the empodial appendage and only six pairs of setae on the dentes. With the latter it agrees in the inner tooth of the claw. The mucro differs in length and shape from both.

Family ENTOMOBRYIDAE Börner, 1913.

Genus ENTOMOBRYA Rondani, 1861.

syn. = 1740, *Podura* Linnè (ad partem).

1838, *Choreutes* Burmeister (ad partem).

1839, *Isotoma* Bourlet (ad partem).

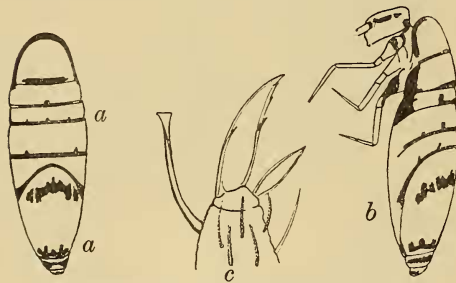
1841, *Degeeria* Nicolet (ad partem).

1861, *Entomobrya* Rondani.

ENTOMOBRYA DECEMFASCIATA Packard, 1873.

(Text-fig. 8, a-c.)

This species has only recently been rediscovered in Mexico (Handschin, 1928). It is now known to occur in most temperate



TEXT-FIG. 8.—*Entomobrya 10 fasciata* Pk., Handschin.

parts of the world, including Europe. Denis (1931) in remarking on this species regrets that Handschin has not given any details or figures of the claws. I therefore reproduce Handschin's figures of the entire insect and add a figure of the front claw. In South Africa it was found in some numbers amongst shore herbage at Muizenberg, C.P., on 25th July 1930 (H. W.), and it was also present in material collected by Mr. M. C. Mossop from under mown grass at the Experiment Station, Salisbury, S. Rhodesia, March 1930.

ENTOMOBRYA NIVALIS Linnè, 1758.

f. IMMACULATA Schäffer, 1896.

Entomobrya nivalis-pallida Carl, 1901.

Degeeria lanuginosa Nicolet, 1841.

Entomobrya multifasciata-lanuginosa Brook, 1884.

„ *flava* Lie-Pettersen, 1896.

Locality.—Rondebosch, C.P., 29th July 1930 (H. W.).

f. MACULATA Schäffer, 1896.

Degeeria nicoleti Lubbock, 1876.

Entomobrya muscorum-nicoleti Agren., 1903.

„ *multifasciata-nicoleti* Brook, 1884.

Localities.—Stellenbosch, C.P., 28th Aug. 1927 (Hesse); 8th Aug. 1930 (H. W.); Rondebosch, C.P., 29th July 1930 (H. W.).

Both these forms are well-known European insects and are probably introductions into South Africa.

Genus LEPIDOCYRTUS Bourlet, 1839.

syn. = 1767, *Podura* Linnè (ad partem).

1840, *Paidium* Koch.

1841, *Cyphodeirus* Nicolet (ad partem).

LEPIDOCYRTUS LANUGINOSUS (Gmelin), Tullberg (1788), 1871.

Podura lanuginosa Gmelin, 1788.

Lepidocyrtus aeneus Nicolet, 1841.

„ *albicans* Reuter.

„ *fuscatus* Uzel, 1890.

„ *montanus* Carl, 1901.

„ *pusillus* Linnè, 1767.

This is almost a cosmopolitan species. In Africa it has been recorded by Börner (1906) from the Island of Pemba, off Zanzibar, under the subspecies *ceratoxenus*. In South Africa and Rhodesia the author has examined typical specimens from the following localities:—

French Hoek, C.P., at 2000 feet, Dec. 1916 (K. H. B.); Experiment Station, Salisbury, S. Rhodesia, March 1930 (M. C. M.); Kloof Nek, Cape Town, 27th July 1930 (H. W.); Rondebosch, C.P., 19th July 1930 (H. W.); Stellenbosch, C.P., 12th Aug. 1930 (H. W.); Signal Hill, Cape Town, 31st Aug. 1930 (H. W.); Cape Town, 24th Aug. 1930 (H. W.); Hout Bay, C.P., 30th Aug. 1930 (H. W.); Kirstenbosch, C.P., 2nd Aug. 1930 (H. W.).

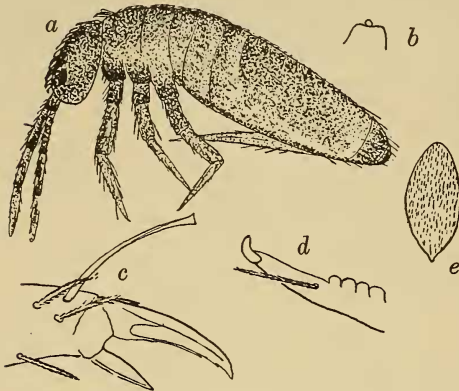
Genus PSEUDOSIRA Schött, 1893.

PSEUDOSIRA GRISEA n. sp.

(Text-fig. 9, a-e.)

Description.—Length 2.2 mm. Colour entirely bluish-black, except the furca, tibia-tarsi and apical antennal segments, which are

somewhat lighter. Eyes 8 on each side on a black patch. Antennae $2\frac{1}{2}$ times as long as head, segments I : II : III : IV = $3\frac{1}{2}$: 5 : 5 : $7\frac{1}{2}$, IV with apical knob and unannulated. Th. II : III : abd. I : II : III : IV : V : VI = 7 : 4 : 3 : 4 : 4 : 15 : 3 : $1\frac{1}{2}$. Claw with two inner teeth; empodial appendage lanceolate, simple. Tibio-



TEXT-FIG. 9.—*Pseudosira grisea* n. sp.

tarsal spathulate seta as long as claw. Furca reaching past ventral tube, mucro falciform without basal spine, unannulated portion of dentes slightly more than twice as long as mucro, mucro only $\frac{1}{4}$ as long as hind claw. Manubrium : mucrodens = 2 : $2\frac{1}{2}$. Clothing of scales distinctly marked with numerous short striations, apices obtusely pointed. Clavate ciliated setae on neck and thorax I. Antennae, furca, and legs with ciliated setae, a few outstanding ones on ant. II.

var. ANNULATA n. var.

Colour bluish-black with the pigmentation much lighter on anterior half of thorax III and abd. I–VI, giving the appearance of transverse stripes.

Co-types in the Cape Town Museum.

Localities :

f. principalis.—Rosebank, C.P., 22nd July 1930 (H. W.); Rondebosch, C.P., 29th July 1930 (H. W.).

v. annulata.—Kirstenbosch, C.P., 23rd July 1930.

Genus LEPIDOCYRTINUS Börner, 1903.

syn. = 1841, *Degeeria* Nicolet (ad partem).

1867, *Seira* Lubbock (ad partem).

1893, *Pseudosira* Schött (ad partem).

LEPIDOCYRTINUS INCERTUS Handschin, 1926.

A few specimens agreeing in coloration and morphological characters with this species, which was described by Handschin from Algeria, were found amongst the material collected by Dr. Barnard on Keurbooms River Estuary in Jan. 1931.

LEPIDOCYRTINUS PSEUDOCOERULEUS (Denis), 1924.

Sira pseudocoerulea Denis, 1924.

This species was described by Denis from material from Abyssinia in the Paris Museum. Specimens which appear to be referable to it have been found in South Africa as below. I can detect no difference in details between these specimens and the original description.

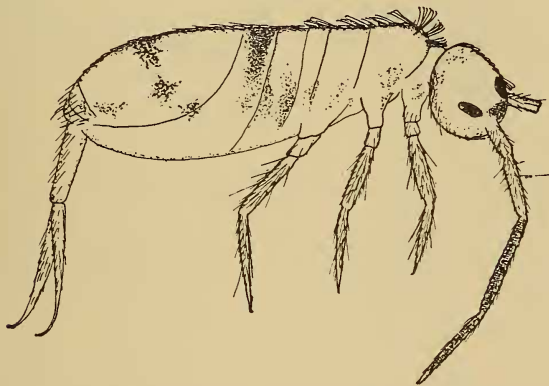
Kirstenbosch, C.P., 23rd July 1930 (H. W.); French Hoek, C.P., at 2000 feet, Dec. 1916 (K. H. B.); Hout Bay, C.P., Aug. 1930 (H. W.); Signal Hill, Cape Town, 31st Aug. 1930 (H. W.).

LEPIDOCYRTINUS COOPERI Handschin, 1929.

var. BARNARDI n. var.

(Text-fig. 10.)

This species is fairly common in the Cape Town neighbourhood, but all the specimens found differ constantly from the typical form



TEXT-FIG. 10.—*Lepidocyrtinus cooperi* Hand. v. *barnardi* v. n.

in the colour markings. The dark pigmentation on abdomen II of *L. cooperi*, instead of forming a complete band, is only present laterally, while on abdomen IV the band is present as a medial irregular transverse streak, and there is a posterior lateral spot on each side. In morphological details it fits very well into Handschin's diagnosis. I have great pleasure in associating Dr. Barnard's name with this form.

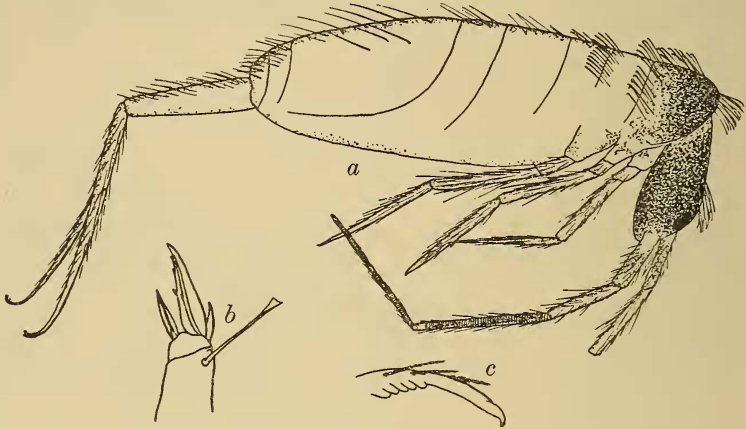
Co-types in the Cape Town Museum.

Localities.—Cape Town, 16th Dec. 1916; 1st Aug. 1915 at 1000 feet (K. H. B.); Kirstenbosch, C.P., 22nd July 1930 (H. W.).

LEPIDOCYRTINUS CAPENSIS n. sp.

(Text-fig. 11, a-c.)

Description.—Length 3 mm. Colour, yellowish ground with deep blue pigment on head, ant. I, th. II, and in darkest specimens laterally on abdominal segments. Eye patches black. Head bent vertically under thorax II. Antennae reaching beyond tip of

TEXT-FIG. 11.—*Lepidocyrtinus capensis* n. sp.

abdomen, I two-thirds length of head, segments I : II : III : IV = 2 : 3 : 4 : $3\frac{1}{2}$, III and IV distinctly annulated, IV with apical reversible knob. Head : th. II : III : abd. I : II : III : IV : V : VI = 3 : $2\frac{1}{2}$: $1\frac{1}{2}$: $1\frac{1}{4}$: $1\frac{1}{2}$: $1\frac{1}{2}$: 6 : $\frac{2}{3}$: $\frac{1}{2}$. Eyes 8 on each side.

Furca long; manubrium : mucrodens = 4 : 6, mucro falciform without basal spine, unannulated portions of dens 3 times as long as mucro, mucro one-third as long as hind claw. Claw with basal pair of inner teeth and 2 distal inner teeth, and a pair of strong outer lateral teeth the tips of which almost reach the level of paired inner teeth. Empodial appendage lanceolate, broad, simple, reaching beyond paired inner teeth of claw. Spatulate tibial hair long. Clothing of hairs and scales typical of the genus.

Co-types in the Cape Town Museum.

This interesting species, which in coloration is intermediate between *L. lesnei* Denis from Algeria and *L. semicoloratus* Handschin from Mexico, was taken in small numbers by Dr. Barnard on Matroosberg (Ceres side, Farm Laken Vallei), C.P., at 3500 feet in Jan. 1917.

LEPIDOCYRTINUS FLAVOVIRENS Börner, 1903.

This species was described by Börner (1903) from Nyassa under the name of *Lepidocyrtus flavovirens*. Specimens from the following localities may be referred to it:—

French Hoek, C.P., at 2000 feet, Dec. 1916 (K. H. B.); Matroosberg (Ceres side, Farm Laken Vallei), at 3500 feet, Jan. 1917 (K. H. B.); Hout Bay, C.P., Aug. 1930 (H. W.).

var. ANNULOSA Wahlgren, 1906.

Specimens agreeing in their entirety with the descriptions of Börner, Wahlgren, and later Denis (1924), were taken among shore herbage at Muizenberg, C.P., 25th July 1930 (H. W.).

LEPIDOCYRTUS ANNULIPES Handschin, 1929.

The original description of this species is anything but satisfactory, especially for a member of what is perhaps one of the most difficult groups of the Collembola. Except for size and coloration of antennae, the description would just as well fit the previous species. In particular the length of the antennae is not given, nor are any proportions of the antennal segments. It is therefore with some hesitation that the specimens from the two following localities are referred to *L. annulipes*. Additional details of the specimens are:

Length 4.5 mm. Colour as described by Handschin. Antennae three-fourths of body length; segments I : II : III : IV = 16 : 30 : 40 : 30; III and IV annulated; I and II together one-third as long again as the head. Thorax II twice as long as III. Abd. IV : III = 5 : 1½.

Localities.—Inchanga, Natal, Nov. 1917 (K. H. B.); Keeromberg, Worcester Mts., C.P., 3500 feet, Sept. 1930 (K. H. B.).

Specimens from the following localities are still more uncertain, but as the determination of this group of species, comprising *L. annulicornis* Börner, *voeltzkowi* B., *laeta* B., *aethiopica* Den., and *annulipes* Handschin is such a difficult and unsatisfactory business, I must be content to refer them dubiously to Handschin's species. These other localities are:

Great Winterhoek Mts., Tulbagh, C.P., Nov. 1916 (K. H. B.); Hottentots Holland Mts., C.P., Jan. 1916 (K. H. B.); Kloof Nek, Cape Town, 31st Aug. 1930 (H. W.); Stellenbosch, C.P., 29th Aug. 1930 (H. W.).

Family TOMOCERIDAE Börner, 1903.

NEOPHORELLA n. gen.

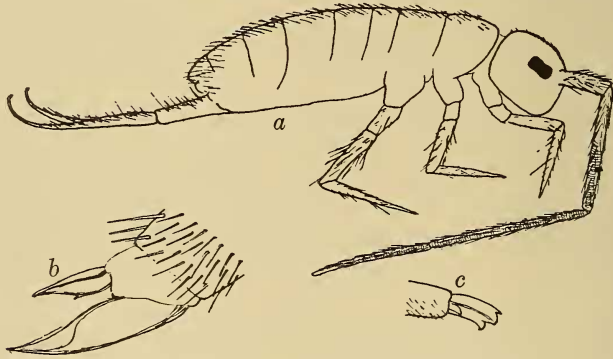
Description.—Abdomen III longer than IV, all abdominal tergites distinct. Without scales. Post-antennal organ absent. Ciliated sensory setae apparently absent from abdominal segments. Furca well developed. Dentes not distinctly annulated. Mucro small, of isotomurus type. No dental spines. Ant. III longer than IV, both annulated. Ocelli present. Tibial spur hair absent.

This genus connects the *Tomoceridae* with the *Isotomidae* in the structure of the mucro and the absence of scales, while in the other characters it is intermediate between the subfamilies *Lepidophorellinae* and *Tomocerinae* of the *Tomoceridae*.

NEOPHORELLA DUBIA n. sp.

(Text-fig. 12, a-e.)

Description.—Length 3.5 mm. Colour (in spirit) entirely yellow, except for the black eye patches and a small black spot between the



TEXT-FIG. 12.—*Neophorella dubia* n.g. n. sp.

antennae bases; apical segments of antennae slightly bluish. Eyes 8 on each side. ? Antennae slightly longer than body; segments I : II : III : IV = $1 : 2\frac{1}{3} : 2\frac{2}{3} : 2$; IV, III, and half of II distinctly annulated. Th. II : III = 4 : 3; abd. III : IV = $1\frac{1}{2} : 1$. Manubrium : mucrodens = 1 : 2. Claw long and strong without inner teeth, with inner groove which opens at about half-way (*cf.* fig.). Empodial appendage with broad inner and narrow outer lamella and a tooth at angle of inner lamella. Furca long and dentes not distinctly annulated. Mucro with 4 teeth as in *Isotomurus palustris* Müll.

Tibiotarsal spur hair absent. Mucro $\frac{1}{8}$ as long as hind claw. Clothing of fine simple setae of uniform length and no outstanding setae.

Locality.—Table Mt., Cape Town, at 2500 feet, 12th Sept. 1913 (K. H. B.), 1 spec.

The special features of this very interesting form have been discussed under the description of the genus.

Family CYPHODERIDAE Börner, 1913.

Genus CYPHODERUS Nicolet, 1841.

CYPHODERUS NATALENSIS Börner, 1913.

Localities.—In ants nests, Table Mt., Cape Town, 27th July 1930 (H. W.); in ants nests, Hout Bay, C.P., Aug. 1930 (H. W.).

CYPHODERUS ARCUATUS Wahlgren, 1903.

var. AETHIOPICUS Handschin, 1929.

Specimens agreeing with Handschin's variety of Wahlgren's species were obtained in small numbers in the inner recesses of the Cango Caves, Oudtshoorn, Nov. 1929, by Dr. Barnard.

On the genus *Lepidocyrtoides* Schött.

In his work on the Australian *Collembola* ("Results of Dr. Mjöberg's Swedish Sci. Exp. to Australia," Arkiv. f. zool., 1917), Dr. Schött erected the genus *Lepidocyrtoides* for certain tropical species of the older genus *Lepidocyrtus* as follows: "Tropischer Formen mit deutlich bis gar nicht hervorragenden Mesonotum, langen Antennen mit retractilen Sinneskolben am Ant. IV und deutlich längegestreiften Schuppen von verschiedener Form." He recognised at the time, however, that the forms which he placed under *Lepidocyrtoides* were rather a heterogeneous assemblage. In 1925 ("*Collembola* from Northern Sarawak," Sarawak Museum Journal) he again discusses these forms and removes *L. sagmarius*, *australicus*, *coeruleus*, and *cinctus* from *Lepidocyrtoides* to a new genus *Lepidosira*. He particularly states here, that he wishes to keep *L. cucularis* as the type of the *Lepidocyrtoides* (obviously misprinted *Lepidocyrtus*). He separates these two genera mainly on the form; those having the mesonotum not overhanging he places in *Lepidosira*.

I have been working now for some time on a considerable amount of Australian material, and I have found that as so far suggested by

Schött his classification works very well. Unfortunately, however, in 1927 in a second paper on the Collembola of the Cameroons (Kamerunische Collembolen. Linköping) he again reopens the question, and on p. 16 he diagnoses afresh the genus *Lepidocyrtoides*. He now gives the main characters as "Tibien ungegliedert, Endkolben am Ant. IV. nicht vorhanden." This is obviously quite the opposite of his original diagnosis and would not allow of *L. cucularis* being kept as the genotype. Furthermore, these characters are essentially those of *Lepidocyrtus* s. str. On the basis of this newer diagnosis he removes his Cameroon species *L. ferrugineus* and *maximus* from *Lepidocyrtus*, where he had originally placed them to *Lepidocyrtoides*.

Apart from the validity of his second diagnosis, it seems to me that his more recent classification is impracticable and but serves to make what is at the best a difficult study, only more difficult. In this paper I retain his older views and include his species from the Cameroons in the genus *Lepidocyrtus* s. str. From this it follows that *Lepidocyrtoides* is not an African genus, but is confined to Australasia.

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EXPLANATION OF TEXT-FIGURES.

- TEXT-FIG. 1.—*Hypogastrura armata* (Nic.). Anal spines of a aberrant specimen.
- TEXT-FIG. 2.—*Polyacanthella barnardi* n. sp. (a) Eye patch; (b) hind tibiotarsus and claw; (c) dens and mucro; (d) anal segment and spines from above.
- TEXT-FIG. 3.—*Bruchystomella capitata* n. sp. (a) Anterior ocelli and post-antennal organ; (b) head of maxillae; (c) antennal organ III; (d) hind tibiotarsus and claw; (e) anal segments.
- TEXT-FIG. 4.—*Achorutes natalensis* n. sp. (a) Antenna; (b) head tubercle showing ocelli; (c) claw.
- TEXT-FIG. 5.—*Isotoma mossopi* n. sp. (a) Ocelli and post-antennal organ; (b) hind claw; (c) tip of dens and mucro.
- TEXT-FIG. 6.—*Vertagopus minos* Denis. (a) Male; (b) female; (c) anterior ocelli and post-antennal organ; (d) hind foot; (e) mucro; (f) dorsal seta of posterior segments; (g) lateral seta of dorsal segments.
- TEXT-FIG. 7.—*Proisotoma africana* n. sp. (a) Ocelli and post-antennal organ; (b) hind claw; (c) dens and mucro.
- TEXT-FIG. 8.—*Entomobrya decemfasciata* Packard, Handschin. (a) Dorsal view, after Handschin; (b) lateral view, after Handschin; (c) hind claw.
- TEXT-FIG. 9.—*Pseudosira grisea* n. sp. (a) Entire insect; (b) tip of antenna IV; (c) foot; (d) tip of dens and mucro; (e) body scale.
- TEXT-FIG. 10.—*Lepidocyrtinus cooperi* Handschin var. *barnardi* v. nov.
- TEXT-FIG. 11.—*Lepidocyrtinus capensis* n. sp. (a) Lateral view; (b) foot; (c) tip of dens and mucro.
- TEXT-FIG. 12.—*Neophorella dubia* n. gen., n. sp. (a) Entire insect from side; (b) claw and tip of tibiotarsus; (c) mucro.